

# The Impact of Health Insurance on the Access to Health Care and Financial Protection in Rural Developing Countries

## The Example of Senegal

Johannes Paul Jutting

September 2001







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## Health, Nutrition and Population Discussion Paper

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# Health, Nutrition and Population Discussion Paper

## The Impact of Health Insurance on the Access to Health Care and Financial Protection in Rural Developing Countries *The Example of Senegal*

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Prepared for “Health Systems Financing in Low-income African and Asian Countries,” CERDI, November 2000, Clermont-Ferrand, France

**Abstract:** Community-based health insurance schemes are becoming increasingly recognized as an instrument to finance health care in developing countries. Taking the example of “les mutuelles de santés” (mutual health organization) in rural Senegal this paper analyzes whether or not members in a mutual health insurance scheme have better access to health care than nonmembers. A binary probit model is estimated for the determinants of participation in a mutual and a logit/log linear model is used to measure the impact on health care utilization and financial protection. The results show that, while the health insurance schemes reach otherwise excluded people, the very poorest in the communities are not covered. Regarding the impact on the access to health care, members have a higher probability of using hospitalization services than nonmembers and pay substantially less when they need care. Given the results of this study, community financing schemes have the potential to improve the risk-management capacity of rural households. To reduce identified limitations of the schemes, an enlargement of the risk pool and a scaling up or linking of the schemes is, however, a prerequisite. Appropriate instruments to be further tested should include reinsurance policies, subsidies for the poorest and developing linkages to the private sector via the promotion of group insurance policies. All these instruments call for a stronger role of public health policy.

**Keywords:** community financing, access to health care, local organizations, Senegal

**Disclaimer :** The findings, interpretations and conclusions expressed in this paper are entirely those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent.

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## PREFACE

In January 2000, Dr. Gro Harlem Brundtland, Director General of the World Health Organization (WHO), established a Commission on Macroeconomics and Health (CMH) to provide evidence about the importance of health to economic development and poverty alleviation.

This HNP Discussion Paper is based on a Report on community financing submitted in September 2001 to Working Group 3 of the CMH. The mandate of Working Group 3 was to examine alternative approaches to domestic resources mobilization, risk protection against the cost of illness and resource allocation. The working group was chaired by Professor Alan Tait (Former Deputy Director of Fiscal Affairs, International Monetary Fund, and currently Honorary Fellow at University of Kent at Canterbury and Honorary Fellow at Trinity College, Dublin) and Professor Kwesi Botchewey (Director of Africa Research and Programs at the Harvard Center for International Development).

Professor Jeffery D. Sachs (Chairman of the Commission and Director of the Harvard Center for International Development) presented the findings of the CMH in a Report that was submitted to WHO on December 20, 2001—[\*Macroeconomics and Health: Investing in Health for Economic Development\*](#).

The report of the CMH recommended a six-pronged approach to domestic resource mobilization at low-income levels: “(a) increased mobilization of general tax revenues for health, on the order of 1 percent of GNP by 2007 and 2 percent of GNP by 2015; (b) increased donor support to finance the provision of public goods and to ensure access for the poor to essential health services; (c) conversion of current out-of-pocket expenditure into prepayment schemes, including community financing programs supported by public funding, where feasible; (d) a deepening of the HIPC (Highly Indebted Poor Countries) initiative, in country coverage and in the extent of debt relief (with support from the bilateral donor community); (e) effort to address existing inefficiencies in the way in which government resources are presently allocated and used in the health sector; and (f) reallocating public outlays more generally from unproductive expenditure and subsidies to social-sector programs focused on the poor.”

Most community financing schemes have evolved in the context of severe economic constraints, political instability, and lack of good governance. Usually government taxation capacity is weak, formal mechanisms of social protection for vulnerable populations absent, and government oversight of the informal health sector lacking. In this context of extreme public sector failure, community involvement in the financing of health care provides a critical but insufficient first step in the long march toward improved access to health care by the poor and social protection against the cost of illness.

The CMH stressed that community financing schemes are no panacea for the problems that low-income countries face in resource mobilization. They should be regarded as a complement to—not as a substitute for—strong government involvement in health care financing and risk management related to the cost of illness.

Based on an extensive survey of the literature, the main strengths of community financing schemes are the degree of outreach penetration achieved through community participation, their contribution to financial protection against illness, and increase in access to health care by low-income rural and informal sector workers. Their main weaknesses are the low volume of revenues that can be mobilized from poor communities, the frequent exclusion of the poorest from participation in such schemes without some form of subsidy, the small size of the risk pool, the limited management capacity that exists in rural and low-income contexts, and their isolation from the more comprehensive benefits that are often available through more formal health financing mechanisms and provider networks.

The work by the CMH proposed concrete public policy measures that governments can introduce to strengthen and improve the effectiveness of community involvement in health care financing. This includes: (a) increased and well-targeted subsidies to pay for the premiums of low-income populations; (b) use of insurance to protect against expenditure fluctuations and use of reinsurance to enlarge the effective size of small risk pools; (c) use of effective prevention and case-management techniques to limit expenditure fluctuations; (d) technical support to strengthen the management capacity of local schemes; and (e) establishment and strengthening of links with the formal financing and provider networks.

The report presented in this *HNP Discussion Paper* has made a valuable contribution to our understanding of some of the strengths, weaknesses and policy options for securing better access for the poor to health care and financial protection against the impoverishing effects of illness, especially for rural and informal sector workers in low-income countries.

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## I. EXECUTIVE SUMMARY

Community-based health insurance schemes are becoming increasingly recognized as an instrument to finance health care in developing countries. Taking the example of “les mutuelles de santés” (mutual health organization) in rural Senegal, this paper analyzes whether or not members in a mutual health insurance scheme have a better access to health care than nonmembers. A binary probit model is estimated for the determinants of participation in a mutual and a logit/log linear model is used to measure the impact on health care utilization and financial protection. The results show that while the health insurance schemes reach otherwise excluded people, the poorest in the communities are not covered. Regarding the impact on the access to health care, members have a higher probability of using hospitalization services than to nonmembers and pay substantially less when they need care. Given the results from this study, community financing schemes have the potential to improve the risk-management capacity of rural households. To reduce identified limitations of the schemes, an enlargement of the risk pool and a scaling up or linking of the schemes is, however, a prerequisite. Appropriate instruments to be further tested should include reinsurance policies, subsidies for the poorest, and developing linkages to the private sector via the promotion of group insurance policies. All these instruments call for a stronger public health policy role.

## II. INTRODUCTION

Health insurance schemes are an increasingly recognized factor as a tool to finance health care provision in low-income countries (WHO 2000). Given the high latent demand from people for health care services of a good quality and the extreme underutilization of health services in several countries, it has been argued that social health insurance may improve access to acceptable quality health care. Whereas alternative forms of health care financing and cost-recovery strategies like user fees have been criticized by many authors (e.g., Gilson 1998), the option of insurance seems to be a promising alternative as it is a possibility to pool risks, thereby transferring, unforeseeable health care costs to fixed premiums (Griffin 1992). However, there is some evidence that neither purely statutory social health insurance nor commercial insurance schemes alone can significantly contribute to increase coverage rates and thereby broaden access to health care. Especially in rural and remote areas, unit transaction cost of contracts are too high, leading often to a state and market failure (Jütting 2000). Recently, mainly in Sub-Saharan Africa but also in a variety of other countries, nonprofit, mutual, community-based health insurance schemes<sup>1</sup> have emerged (Bennett et al. 1998, Wiesmann and Jütting 2001, Jakab and Krishnan 2001)<sup>2</sup>. These schemes are characterized by an ethic of mutual aid, solidarity, and collective pooling of health risks (Atim 1998). In several countries, these schemes operate in conjunction with health care providers, mainly hospitals in the area.

Proponents argue that these schemes have the potential to increase access to health care (e.g., Dror and Jacquier 1999). The results of the few available studies so far, however, are less optimistic (e.g., Bennett et al. 1998, Criel 1998, Atim 1998). It is argued that often the risk pool is too small, adverse selection problems arise, the schemes are heavily dependent on subsidies, financial and managerial difficulties arise, and overall sustainability does not seem to be insured. Whereas these studies are important contributions to our knowledge about the strengths and weaknesses of the schemes in general, the context in which these schemes have been introduced and the objectives of the schemes themselves have not been given enough attention. Also, the potential social benefit of the schemes, i.e., their impact on access to health care, labor productivity, and households' risk-management capacity has been largely ignored. Against this background, this paper analyzes whether mutual health insurance schemes improve access to health care in rural Senegal. We tackle two principal questions: What are the important socioeconomic determinants that explain membership in a voluntary health insurance scheme? Thereby we identify important factors influencing the demand for health insurance. Second, what is the impact of the schemes on the utilization of health care and the level of financial protection between members and nonmembers?

To answer these questions we use a binary probit model for estimating marginal coefficients for the determinants of participation and a logit/log-linear model to analyze the impact on health care utilization and financial protection between members and nonmembers. By applying this methodology, we go beyond most of the available studies on the impact of community financing schemes so far, which have either relied on secondary literature (e.g., Bennett et al. 1998) or restricted their data analysis to qualitative interpretations (e.g., Atim 1998).

We have chosen the case of Senegal, which is interesting because we find here (Tine 2000):

- a relatively long (10 years) experience with mutual health insurance schemes
- an innovative institutional setting. There is a contract between a nonprofit health care provider, a catholic-run hospital, and the mutuals, which allows them to receive health care at a lower rate.

The outline of the paper is as follows: Section 2 gives a quick overview of health insurance schemes in rural Sub-Saharan Africa and presents the specific situation in Senegal. Section 3 describes the research design and

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<sup>1</sup> The term “community-based health insurance” and “mutual health insurance” is used interchangeably throughout this paper.

<sup>2</sup> For a more detailed typology see (Jakab and Krishnan 2000).

the methodology used. The results of the estimations are discussed in Section 4. Section 5 presents the conclusions.

### III. HEALTH INSURANCE IN RURAL SUB-SAHARAN AFRICA

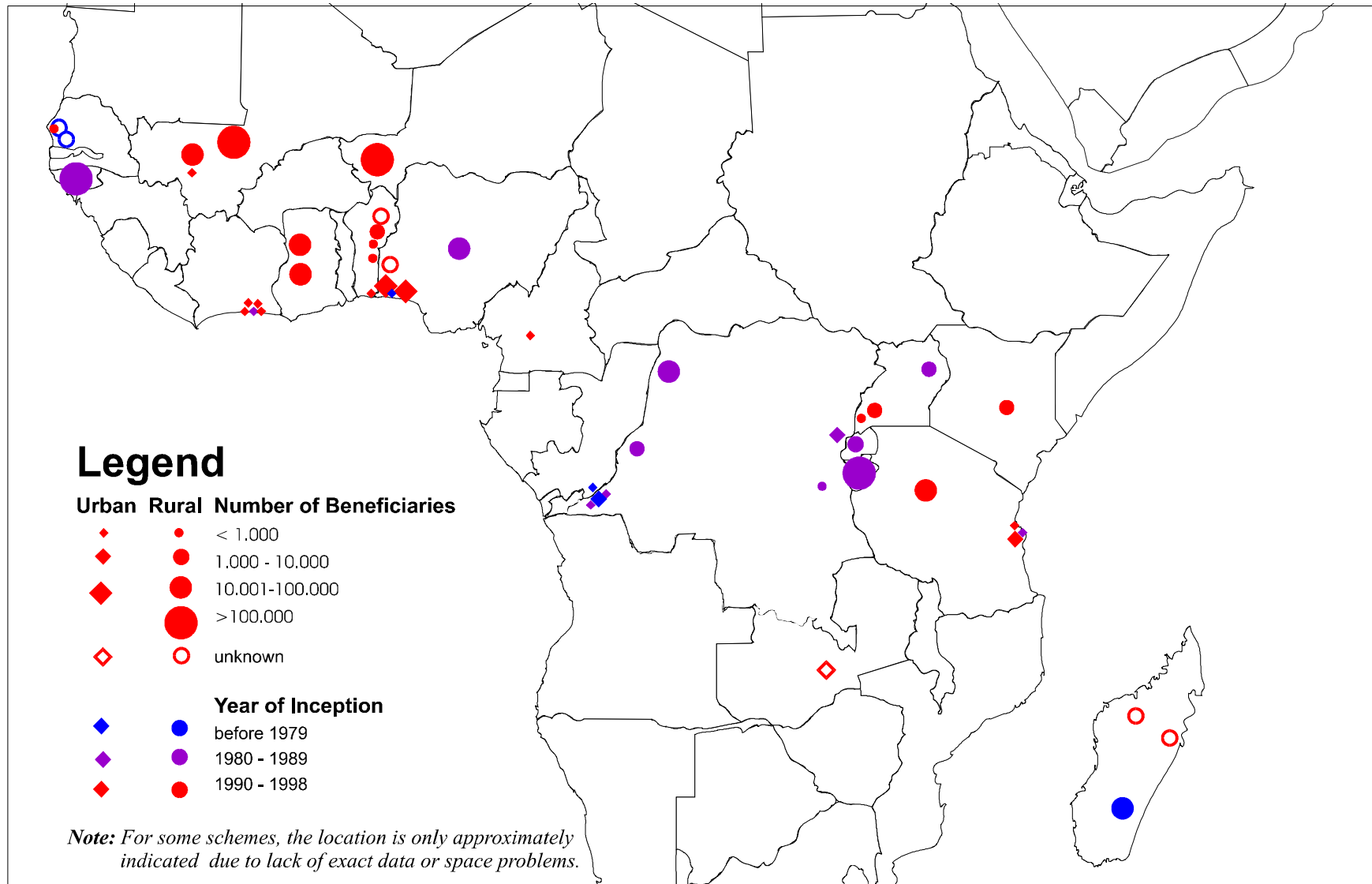
Wiesmann and Jütting (2001) present a detailed overview of health insurance schemes outside formal sector employment in Sub-Saharan Africa, which is based on extensive research done in the past few years (Bennett et al. 1998, Atim 1998, Musau 1999). Most of the schemes were set up in the 1990s. The reasons that promote and foster the development of mutual health insurance schemes have not been analyzed in depth so far, but some trends are obvious (Wiesmann and Jütting 2001): First, people have been forced to think about alternative solutions as health care is no longer offered for free at the public facilities and the introduction of user fees has had negative effects, especially for the poor. Second, in the context of decentralization, more power has been delegated to the communities, which allows them to also assume more responsibilities in the provision of local public goods. Third, the quite positive experience with credit and financing institutions is leading to a discussion about whether the mutuals should enlarge their portfolio to include also insurance products. Finally, the debate in the literature over the cost of illness debate has shown that health shocks often force households into high-cost risk-coping strategies. Access to insurance could reduce these costs substantially (Weinberger and Jütting 2000, Asfaw et al. 2001).

The map in Figure 1 gives a view of health insurance schemes outside the formal employment sector in Sub-Saharan Africa<sup>3</sup>. The map clearly shows that, so far, community-based health insurance is more common in West Africa than in Central or East Africa. In some countries, these new schemes are mainly an urban phenomenon—such as in Côte d’Ivoire and in Tanzania—whereas in such states as Uganda, Ghana, and Benin, they predominantly cover people in rural areas.

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<sup>3</sup> The following section draws on Wiesmann and Jütting (2001).

**Figure 1: Urban and rural health insurance schemes in Sub-Saharan Africa—year of inception and size**



Source: Wiesmann and Jütting (2001)

Some of the schemes are confined to a local cooperative of craftsmen or traders, and therefore they are often very small, perhaps fewer than a hundred 100 beneficiaries (Kiwara 1997). Other insurance schemes extend over the whole country and many communities and include up to 1 million or more beneficiaries (Bennett et al. 1998). The number of beneficiaries can change rapidly and neither reveals the financial balance of the schemes, nor does it say much about the scheme’s sustainability. Indeed, a few schemes had to be terminated after some years (Criel 1998, Bennett et al. 1998), while others have been in operation for decades.

Senegal has a relatively long tradition of mutual health insurance. The first experience started in the village of Fandène in the Thiès region in 1990. From the beginning, the movement in Senegal has been supported by a local health care provider, the nonprofit hospital St. Jean de Dieu. Today, 16 mutual health insurance schemes operate in the area of Thiès. The main features of the schemes are:

- They schemes are community based.
- Ninety percent of the schemes operate in rural areas.
- With the exception of one mutual—Ngaye Ngaye— they cover only hospitalization.
- The mutuels have a contract with the hospital St. Jean de Dieu, where they get a reduction of up to 50 percent for treatment
- In general, the household is a member of a mutual, which participates in decisions. The member has a membership card on which he can put all or selected members of his family (beneficiaries). The membership fee is per person insured.

Table 1: Hospitalization fees for members and nonmembers at St. Jean de Dieu Hospital

|   | <b>Hospitalization</b>         |                          |                               |
|---|--------------------------------|--------------------------|-------------------------------|
|   | <b>Ticket for consultation</b> | <b>Daily cost</b>        | <b>Operation (surgery)</b>    |
| <b>Members</b><br><b>Payment by :</b>   | 3 000 F CFA<br>member          | 3 750 F CFA<br>mutual    | 750 F CFA/unit<br>member      |
| <b>Nonmembers</b><br><b>Payment by:</b> | 6 000 F CFA<br>nonmember       | 7 500 F CFA<br>nonmember | 1 500 F CFA/unit<br>nonmember |

Source: ZEF-ISED survey, 2000

Table 1 shows that a member has to pay a minimum amount of 3.000 F CFA for a treatment. For surgery, he pays 50 percent of the total costs for the operation. The daily cost of hospitalization, including also laboratory analysis, consultation, and to some radiography, is paid by the mutual, which receives a reduction of 50 percent. A mutual pays 3750 F CFA/day for each member hospitalized, compared with 7500 F CFA/day paid by nonmembers. In case of hospitalization, the member has to bring with him a letter of guarantee from the manager of the mutual if the member has paid the insurance premium regularly. A hospital stay of between 10 and 15 days is entirely paid by the mutual. If the hospitalization exceeds this limit, the mutual pays the hospital the entire invoiced amount, because it guaranteed to do so. Afterward the member reimburses the mutual in instalments. To receive the described benefits, the members of a mutual have to pay a monthly premium of between 100 and 200 F CFA, and the head of household has to buy a membership card for 1,000 F CFA, a one-time fee.

## IV. RESEARCH DESIGN AND METHODOLOGY

### A. RESEARCH DESIGN

A household survey was carried out by the Institute for Health and Development (ISED) in Dakar in cooperation with the Center for Development Research in Bonn. It started with a pretest in March 2000; the final survey took place in May 2000. The participation rate in the interviews was very high—more than 95 percent.

For the survey, we chose a two-stage sampling procedure. First, we selected 4 villages out of the 16 villages in which mutuels operate. Each of the selected villages—Fandène, Sanghé, Ngaye Ngaye and Mont Rolland—has only one mutual in place, and it has the same name as the village.

The following table summarizes the major differences between the analyzed schemes:

Table 2: Selection criteria for mutual to be included in the survey

| Name of mutual/Village | Years of operation | Distance from Hospital | Percent of member household in villages | Services            |
|------------------------|--------------------|------------------------|---|---------------------|
| Fandène                | 10 years           | 6 km                   | 90,3                                    | Hospitalization     |
| <b>Sanghé</b>          | 3 years            | 8 km                   | 37,4                                    | Hospitalization     |
| <b>Ngaye Ngaye</b>     | 6 years            | 30 km                  | 81,5                                    | Primary health care |
| <b>Mont Rolland</b>    | 4 years            | 15 km                  | 62,6                                    | Hospitalization     |

Source: ZEF-ISED survey, 2000

In a second step, we randomly selected the households for the interviews. In all four villages, members and nonmembers were interviewed. To get a random sample out of the four villages, we used household lists of all inhabitants (members and nonmembers) of the four villages in order to calculate the percentage distribution between members and nonmembers and their respective weight in the sample. We interviewed 346 households, 70 percent members and 30 percent nonmembers. The data set contains information on roughly 2,900 persons, 60 percent members and 40 percent nonmembers. This means that some household heads have not insured their complete family.

The data were entered immediately after completing the survey using SPSS Windows. In addition to the household survey, we interviewed key persons (leaders of the mutuels) to get complementary information about the mutuels' functioning, problems, and success.

### B. METHODOLOGY

The modeling of an impact of mutual health insurance schemes on health care use and expenditure faces the important challenge of dealing with the problem of “endogeneity” and “self-selection”. This problem receives currently a lot of attention in different areas of development economics: Publications focus on measuring the impact of micro-finance institutions (e.g. COLEMAN 1999, NADA 1999), estimating the returns of education (e.g. BEDI and GASTON 1999) as well as analyzing the impact of health insurance on various outcomes such as health demand and financial protection (WATERS 1999, YIP and BERMAN 2001). In each of these cases the evaluation of a policy intervention or institutional innovation poses the problem that it is very difficult to assign individuals randomly to non-program control groups and others to program treatment groups. From this it results, that the identification of an adequate control group is the first and even most important step when trying to control for self-selection.

With respect to the impact of health insurance on the health care use, WATERS 1999 names the potential endogeneity of the choice of insurance for health care use as the main problem, leading to potential selection bias. Individuals who self-select into the insurance program have unobservable characteristics – related to preference or health status (adverse selection) – that might make them more likely than other to join the program and also might influence their decision to use health care services. An observed association between health insurance affiliation and health care use and expenditure may therefore be due not to insurance but to the underlying unobservable characteristics. To control for this effect, in the Senegal study an omitted variable version of the Hausman test (HAUSMAN 1978) is applied. This test is based on two steps: First, the reduced form of the participation equation is estimated. Second, the fitted values are included into the health care demand equation as a regressor. A significantly non zero coefficient for the predicted value term is an indication that the suspected endogenous variable is in fact endogenous (WATERS 1999)<sup>4</sup>. To specifically control for self-selection into the program, proxies for the health status and health risks have been included in all of the studies. Finally, village or district dummies are included to control for unobservable characteristics of communities such as social values and solidarity to see if it influences individual choice to enroll in a community-financing scheme.

To control for a sample selection bias in the demand equation for health care the total sample is included, i.e. those sick and those not sick as well as those being member and non-members. Finally, the models are checked for stability and robustness through adding and subtracting key variables and by applying the F-test.

To estimate the determinants of participation in a mutual health organization, we follow an approach applied by WEINBERGER (2000). In that approach participation in a local organization is depended on the rational choice of an individual weighting costs and benefits of membership. It is assumed that participation of a household ( $p$ ) in a mutual depend on the current income of the household ( $y$ ), characteristics of the household head ( $H$ ), who decides if the household joins or not, household characteristics ( $Z$ ), community characteristics ( $C$ ) and on the error term  $u$ , who is uncorvariant with the other regressors.

The following equation describes our model:

$$(1) \quad p_i = f(y_i, Z_i, H_i, C)$$

In order to estimate the probability of participation we use a binary probit model:

$$(2) \quad \text{Binary probit model:}$$

$$p_i^* = \beta y_i + \phi Z_i + \alpha H_i + \delta C + u_i$$

$p_i = 1$  if  $p^* > 0$ , meaning the household  $i$  is member of the insurance scheme

$p_i = 0$  otherwise

To assess the impact of mutual health organization on financial protection of members two aspects have to be taken into account: the probability of visiting a health care provider and the out-of-pocket expenditure borne by the individuals. The strong disadvantage of using health care expenditure alone as a predictor of financial protection is that this would allow to capture the lack of financial protection for

---

<sup>4</sup> The test of endogeneity of the membership variable in the health care use and expenditure had to be rejected, i.e. we suppose that membership is exogenous.

those who choose not to seek health care because they cannot afford it. The first part of the model assesses the determinants of utilization and thereby we can analyze whether membership in a mutual reduces barriers to access health care services. We use a two-part model developed as part of the Rand Health Insurance Experiment in the US (MANNING ET AL. 1987).<sup>5</sup>

- a logit model, which assesses the probability of visiting a health care provider:

$\text{Prob}(\text{visit} > 0) = X_{\beta} + M_{\alpha} + u$ , where X stand as a vector for individual, household and community characteristics (including membership) and

- a log-linear model that estimates the incurred level of out-of-pocket expenditures, conditioning on positive use of health care services:

$\text{Log}(\text{out-of pocket expenditure} / \text{visit} > 0) = X_{\gamma} + M_{\chi} + e$

Where X again represents a set of independent variables that are hypothesized to affect individual pattern of utilization, M represents a dummy variable for membership in a mutual health organizations and u and e as terms of interference. The independent variables determining the demand for health care and expenditure in the case of illness are – among others – age, gender, education, health status and income.

The modeling of a mutual health insurance scheme's impact faces the important challenge of dealing with the problem of “endogeneity” and “self-selection.”<sup>6</sup> To control for self-selection, the potential sources have to be identified. With respect to the impact of health insurance on health care use, Waters (1999) names the potential endogeneity of the choice of insurance for health care use as the main problem, leading to potential selection bias. To control for this source of self-selection, we estimate the demand for health insurance taking the entire sample, instead of only the insureds. This also helps us control for potential selection bias due to the potential endogeneity of illness and health care use in of use of a reduced sample of sick persons.

To further reduce potential sources of self-selection by bias, each of the selected four villages as outlined before, has a treatment group (members in a mutual) and a randomly assigned control group (nonmembers). Also, in the models we have explicitly included a proxy for the health status of individuals as an exogenous variable for health care use and expenditure. Selection bias due to village effects and health status is therefore controlled for. In addition, within a single household there are members and nonmembers, which reduces the potential bias related to systematically different preferences between member and nonmember households for health care use and expenditure.

## VI. RESULTS

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<sup>5</sup> For a recent application see YIP and BERMAN (2001).

<sup>6</sup> The problem of self selection is not relevant for our first research question on determinants of participation. But it is relevant for the second research question, which looks at the demand for health care and the amount of expenditure with “health insurance membership” as an exogenous variable.

## **A. DETERMINANTS OF MEMBERSHIP IN A HEALTH INSURANCE SCHEME**

Table 3 gives an overview of the variables are included in the analysis of the determinants of participation.

As outlined above, the decision of a household to participate in a mutual health organization is supposed to be influenced by individual, household, and community characteristics. The variables representing individual characteristics of the household head involves age, education, gender, and membership in another organization. With respect to age, we hypothesize that younger household heads are more open to innovations (age group 1: positive coefficient) and that with increasing age people tend to participate less (age group 3: negative coefficient). Furthermore, we expect that better educated people and male-headed households tend to join a mutual more often than people with less education and female-headed households. The following characteristics of the household is supposed to influence membership in a mutual: income; ethnic group, religion, and the illness ratio (Figure 1).

Table 3: Overview of variables used

| <b>Variable</b>  | <b>Description</b>   | <b>Exp. Sign for participation decision</b> |
|--|--|---|
| <b><i>Individual and household characteristics</i></b> |  |   |
| Sex  | Male (1=yes)   | +   |
| Age group 1  | Age between 21 and 40 years  | +   |
| Age group 3  | Age between 61 and 90 years  | -   |
| Literacy (dummy)                                       | Ability to read/ read and write (1=yes)  | +   |
| Other organization (dummy)                             | Membership in another group (1=yes)  | +   |
| Relationship (dummy)*                                  | Relation to household head (1= self, spouse, parents, children and 0 otherwise)                      | +   |
| Wolof (dummy)  | Household belonging to ethnic group of Wolof (1=yes)   | +   |
| Religion (dummy)                                       | Christian household (1=yes)  | +   |
| Income   | Log Income / household member in F CFA   | +   |
| Income tertiles  | Lower tertile<br>Middle tertile<br>Upper tertile   | -<br>+/-<br>+                               |
| Self-wealth  | Self-classification of household (poor, average, rich)   | -; +-, +                                    |
| Illness-ratio  | Number of cases of illness per household in the last 6 months divided by number of household members | +   |
| Frequency of illness*                                  | Number of cases of illness of an individual in the last six month                                    |   |
| <b><i>Community characteristics</i></b>                |  |   |
| Fandène (dummy)  | Household belonging to Fandène community (1=yes)   | +   |
| Sanghé (dummy)   | Household belonging to Sanghé community (1=yes)  | ?   |
| Ngaye Ngaye (dummy)                                    | Household belonging to Ngaye Ngaye community (1=yes)   | ?   |
| Mont Rolland (dummy)                                   | Household belonging to Mont Rolland community (1=yes)  | ?   |
| Solidarity (dummy)                                     | Perceived solidarity in the village (1=yes)  | +   |

\*: These variables are only used in the equation of determinants of participation on the individual level (see Table 5).

The most important variable to be looked at in the context of our research question is income and its effect on the decision to participate or not. In our study, we have measured “income” as calculated by household expenditure per year and member<sup>7</sup>. We assume that income has a positive influence on the decision to participate and that the poorer strata of the population will not participate due to difficulties in paying the premium. Also, it will be of interest to analyze whether the richer part of the population participates as this is important for risk-pooling reasons. Hence, we include in the regression analysis income tertiles, i.e., we divided our sample in three subgroups “rich,” “average,” and “poor.” Added to the quantitative measures of wealth was relative wealth. Households were asked to classify themselves according to relative wealth within the community on a rank from one (poorer than the average) to three (wealthier than the average). We expect the same findings in tendency for the relative measures as for the quantitative measures.

We have included a dummy variable “Wolof” to measure the influence of belonging to a specific ethnic group. The Wolof are known for their openness to institutional innovations in the Senegalese context (Diallo 2000). The variable “religion” is included to take into account that the mutuals have an exclusive contract with the catholic-owned hospital St. Jean de Dieu. Moreover, the mutuals get active support by the diocese of Thiès. Hence, we expect that more Christians will enroll than Muslims. We assume also a positive relationship between membership in a mutual and membership in other organizations. People who already have experience participating in local organizations are most likely more willing to join a mutual insurance group than people who have no experience participating at all. To control for adverse selection, we integrate the illness ratio of the household as a proxy for the health status. The variable describes the number of cases of illness of household members in relation to the overall household size. It is assumed that less healthy households tend to join mutuals more than healthier ones, leading to adverse selection problems.

Finally, we include dummy variables capturing village characteristics: acknowledgement of solidarity in the village (solidarity) and village factors. We assume that people acknowledging a high value of solidarity in their village tend to participate more. With respect to the village effects, we want to control for the type of insurance—whether it covers hospitalization or only primary health care (Ngaye Ngaye)—as well as for the specific local setting—the cultural environment in the specific village and specific characteristics of the mutual such as distance to the hospital, the functioning of the mutual, and the like.

The results presented in Table 3 show the marginal effects of the probit analysis. Three different models were evaluated, differing in their definition of the income variable. In the first model, income is defined as a metric variable so as to analyze whether income has an influence on membership in a mutual. In the second model, income groups are established to determine effects between different income groups. In the third model, income groups were also formed, but in contrast to model 2 they were not based on expenditure but on self-assessment by the people surveyed<sup>8</sup>.

Table 3 shows that all three methods used are highly significant. Income has the anticipated positive influence on membership. Models 2 and 3 show furthermore that the lower income groups in the villages are significantly less represented in the mutuals. That means that the wealthy people in the communities are more likely to (be able to) participate in the insurance schemes. At the household level, religion and

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<sup>7</sup> Alternatively, we have also measured income as calculated by the revenue from on-farm and off-farm activities as well as remittances. It turned out, however, that there were some estimation bias in the data because some of the people interviewed were unwillingness to report their true income.

<sup>8</sup> Estimating the income of households in developing countries is difficult. Since many of the people surveyed are reluctant to reveal their real income, income is generally measured by using expenditure. This method of measuring can be supplemented by asking the protagonists to do a self-assessment, comparing themselves with other households in the neighbourhood.

ethnic identity play an important role in addition to income. The clearly higher participation by Christians—the probability increases by nearly 40 percentage points compared to non-Christians—was to be expected because of the intensive promotion of the mutuals by the Catholic church.

While household characteristics do have an influence on the membership decision, this is obviously not the case for the individual characteristics of the head of the household such as education, gender, and age. All three characteristics are not significant. Membership in other organizations, however, is a positive factor. People who have already experienced the advantages and disadvantages of being associated to local groups are obviously more disposed toward membership in a health insurance scheme.

The village effects that were discovered are also interesting. Different model variations show, for example, that the inhabitants of the villages Sanghé and Mont Rolland have a significantly lower probability of membership than people from the villages Ngaye Ngaye and Fandène (in Tables 8 and 9 vis à vis Ngaye Ngaye). These results indicate, that the different type of health insurance provided—primary health care in Ngaye Ngaye and inpatient care in the other three mutuals—had no significant influence on the decision to participate. Instead, specific village factors, for example, the management of the mutual seemed to play a role. The mutual of Sanghé has faced several financial and managerial difficulties that have lead to a suspension of operations for some time. As a consequence, several people left the mutual. Efforts to reestablish the mutual have been successful, and today it is functioning again, but with a lower participation rate than before.

Table 4: Marginal coefficients for determinants of participation in mutual health insurance (household level) **Dependent variable: Membership in a mutual (1 if the household is member and 0 otherwise)**

| <b>Variable</b>   | <b>Model 1</b>       | <b>Model 2</b>      | <b>Model 3</b>       |
|---|----------------------|---------------------|----------------------|
| Constant  | -2,048***<br>(0,541) | -0,223<br>(0,155)   | 0,064<br>(0,147)     |
| <b><i>Individual character. of household head</i></b>   |                      |                     |                      |
| Sex (1 = male)  | 0,054<br>(0,083)     | 0,071<br>(0,083)    | -0,001<br>(0,083)    |
| Age group 1 (age 21-40)   | 0,088<br>(0,092)     | 0,085<br>(0,092)    | 0,079<br>(0,091)     |
| Age group 3 (age > 60)  | 0,087<br>(0,061)     | 0,079<br>(0,061)    | 0,101<br>(0,062)     |
| Literacy ( can read/ read and write, 1 = yes)   | 0,059<br>(0,063)     | 0,062<br>(0,063)    | 0,043<br>(0,063)     |
| Other organization (membership in other group, 1=yes)   | 0,180***<br>(0,066)  | 0,183***<br>(0,066) | 0,120*<br>(0,065)    |
| <b><i>Household characteristics</i></b>   |                      |                     |                      |
| Wolof (household belonging to ethnic group of Wolof, 1= yes)                                    | 0,249*<br>(0,135)    | 0,284**<br>(0,137)  | 0,229*<br>(0,133)    |
| Religion (1=Christian)  | 0,370***<br>(0,085)  | 0,369***<br>(0,085) | 0,347***<br>(0,083)  |
| Income (expenditures per household member log)  | 0,167***<br>(0,046)  |                     |                      |
| Income tertile: Lower   |                      | -0,110*<br>(0,063)  |                      |
| Income tertile: Upper   |                      | 0,165**<br>(0,073)  |                      |
| Self-wealth (self-classification of household):<br>Poor   |                      |                     | -0,254***<br>(0,058) |
| Self-wealth: Rich   |                      |                     | 0,018<br>(0,113)     |
| Illness-ratio (number of cases of illness per household divided by number of household members) | 0,002<br>(0,088)     | 0,007<br>(0,088)    | 0,037<br>(0,086)     |
| <b><i>Community characteristics</i></b>   |                      |                     |                      |
| Fandène (household belonging to Fandène community, 1 = yes)                                     | -0,029<br>(0,151)    | -0,011<br>(0,152)   | -0,119<br>(0,150)    |
| Sanghé (household belonging to Sanghé community, 1 = yes)                                       | -0,277**<br>(0,132)  | -0,261*<br>(0,134)  | -0,383***<br>(0,130) |
| Mont Rolland (household belonging to Mont Rolland community, 1 = yes)                           | -0,225<br>(0,139)    | -0,202<br>(0,141)   | -0,308**<br>(0,137)  |
| Solidarity (perceived solidarity in the village, 1=yes)   | 0,103<br>(0,066)     | 0,100<br>(0,067)    | 0,104*<br>(0,065)    |
| Number of observations  | 338                  | 338                 | 341                  |
| Pseudo R <sup>2</sup>   | 0,567                | 0,569               | 0,568                |
| Chi <sup>2</sup>  | 120,32               | 121,39              | 127,96               |
| Prob > Chi <sup>2</sup>   | 0,000                | 0,000               | 0,000                |
| Frequencies of actual / predicted outcomes  | 80 %                 | 80 %                | 80 %                 |

\* Significant at 0,1 level      \*\* Significant at 0,05 level      \*\*\*Significant at 0,01 level

Source: own estimation based on ZEF-ISED survey data

So far the results have shown that the main factors influencing the demand for health insurance in rural Senegal are religion, income, belonging to a certain ethnic group, access to a social network and village effects. These results are largely confirmed by looking at the determinants of participation at the individual level. Regarding the individual level, it is interesting to analyze which type of household members are insured. From a theoretical perspective, one would assume that individuals more prone to the risk of illness are insured. As Table 5 shows, this is largely confirmed as the probability for women and older people is higher than for male and younger persons in the household. It is reasonable to assume that women of child-bearing age and older people do need hospitalization care more often than other household members. Whereas the coefficient for both variables is significant, the marginal effect with less than 0.1 percentage points is rather low, which makes it difficult to diagnose severe adverse selection problems.

Table 5: Marginal coefficients for determinants of participation in mutual health insurance (individual level)

**Dependent variable: Membership in a mutual**

| <b>Variable</b>   | <b>Model 2</b>       |
|---|----------------------|
| Constant  | -0,100*<br>(0,056)   |
| <b><i>Individual and household characteristics</i></b>                |                      |
| Sex (1= male)   | -0,042**<br>(0,021)  |
| Age group 1 (age <26)   | 0,000<br>(0,027)     |
| Age group 3 (age >50)   | 0,077**<br>(0,035)   |
| Literacy (can read/ read and write, 1= yes)                           | 0,109***<br>(0,022)  |
| Other organization (membership in other group, 1= yes)                | 0,070**<br>(0,028)   |
| Relationship ( self, spouse, parents, children, 1 = yes)              | 0,115***<br>(0,022)  |
| Health status (number of cases ill in last 6 months)                  | -0,011<br>(0,020)    |
| Wolof (household belonging to ethnic group of Wolof, 1= yes)          | 0,182***<br>(0,049)  |
| Religion (1= Christian)   | 0,386***<br>(0,033)  |
| Income terzile: Lower   | -0,047**<br>(0,024)  |
| Income terzile: Upper   | 0,219***<br>(0,028)  |
| <b><i>Community characteristics</i></b>                               |                      |
| Fandène (household belonging to Fandène community, 1 = yes)           | -0,058<br>(0,058)    |
| Sanghé (household belonging to Sanghé community, 1 = yes)             | -0,358***<br>(0,050) |
| Mont Rolland (household belonging to Mont Rolland community, 1 = yes) | -0,332***<br>(0,055) |
| Number of observations  | 2855                 |
| Pseudo R <sup>2</sup>   | 0,549                |
| Chi <sup>2</sup>  | 989,02               |
| Prob > Chi <sup>2</sup>   | 0,000                |
| Frequencies of actual / predicted outcomes                            | 77 %                 |

Significant at 0,1 level

\*\* Significant at 0,05 level

\*\*\*Significant at 0,01 level

Source: own estimation based on ZEF-ISED survey data

## B. IMPACT OF MEMBERSHIP ON ACCESS TO MODERN HEALTH CARE SERVICES

In this section, we test the hypothesis that members of a mutual have better access to modern health care facilities than nonmembers. We measure access in two respects: the probability of frequentation of a health care facility, in this case a hospital, and the out-of-pocket expenditure at point of use. Our primary variable of interest is membership in a mutual. We hypothesize that the probability of members' frequenting a hospital is higher, while at the same time they pay less for their treatment in comparison to nonmembers after controlling for individual, household, and community characteristics. This would mean that membership has a positive coefficient for health care demand and a negative one for the effect on expenditure. Besides membership, the other key variable is income as we want to see how much demand health care utilization and out-of-pocket expenditure is due to the income level and the ability to pay.

As control variables we include age, gender, education, and frequency of illness, which capture the need for health care and the health status of an individual. The following household characteristics are included to control for health preferences due to factors like religion and belonging to an ethnic group. Finally, village effects are taken into account for differences in the cost of seeking health care as well as the specific design of the mutuals. One assumption here is that inhabitants from the village in Fandène have better access to health care due to their relatively short distance from the hospital as well as to the reported well-functioning of the mutual. The results of the estimates for the determinants of demand for health care services and costs in the case of illness are presented in Table 6.

Both models are highly significant. Of the 2,856 people, 151 have been in hospital within the last two years<sup>9</sup>. The findings of the estimates for both models suggest that the members of a mutual have better access to health care services than nonmembers. The probability of making use of hospitalization increases by 2 percentage points with membership and expenditure in case of need is reduced by about 50 percent compared with nonmembers. Regarding the individual characteristics, besides membership, age and gender play a role. Moreover, the results suggest that younger people make less use of the hospital than the elderly and they pay less on average if they do fall ill. Furthermore, women use the hospital more than men. Women go to hospital especially when they have problems during pregnancy or childbirth.

Table 6: Probability of hospitalization and determinants of expenditure in case of hospitalization

| Variable | Model 1a<br>(hospital) | Model 1b<br>(hospital) | Model 2a<br>(expend.) | Model 2b<br>(expend.) |
|----------|------------------------|------------------------|-----------------------|-----------------------|
|----------|------------------------|------------------------|-----------------------|-----------------------|

<sup>9</sup> A certain percentage of the hospitalized persons had to be excluded from the "expenditure" analysis as they were not aware of the costs they had to pay because other family members paid for them.

|   |                      |                      |                      |                      |
|---|----------------------|----------------------|----------------------|----------------------|
| Constant  | -0,301***<br>(0,065) | -0,137***<br>(0,021) | 4,611***<br>(2,016)  | 9,445***<br>(0,642)  |
| <b><i>Individual and household characteristics</i></b>                |                      |                      |                      |                      |
| Sex (1= male)   | -0,014**<br>(0,007)  | -0,014**<br>(0,006)  | 0,370<br>(0,214)     | 0,401<br>(0,21)      |
| Age group 1 (age < 26)  | -0,016**<br>(0,008)  | -0,016**<br>(0,008)  | -0,495***<br>(0,258) | -0,520***<br>(0,210) |
| Age group 3 (age > 50)  | 0,022**<br>(0,009)   | 0,022**<br>(0,009)   | -0,008<br>(0,323)    | -0,141<br>(0,327)    |
| Literacy (can read/ read and write, 1= yes)                           | -0,107<br>(0,007)    | -0,010<br>(0,007)    | 0,07<br>(0,243)      | 0,035<br>(0,239)     |
| Membership ( in health insurance without Ngaye Ngaye, 1=yes)          | 0,020**<br>(0,009)   | 0,020**<br>(0,009)   | -0,452**<br>(0,287)  | -0,514**<br>(0,291)  |
| Frequency of illness  | 0,009<br>(0,006)     | 0,008<br>(0,006)     | -0,02<br>(0,16)      | -0,03<br>(0,157)     |
| Type of illness (complications during pregnancy/childbirth, 1=yes)    |                      |                      | 1,273**<br>(0,303)   | 1,125**<br>(0,299)   |
| Severity of illness (number of days hospitalized)                     |                      |                      |                      | 0,015***<br>(0,005)  |
| Wolof (household belonging to ethnic group of Wolof, 1 = yes)         | -0,007<br>(0,020)    | -0,005<br>(0,019)    | -0,002<br>(0,576)    | -0,033<br>(0,582)    |
| Religion (1 = Christian household)                                    | -0,005<br>(0,012)    | -0,004<br>(0,012)    | 0,089<br>(0,324)     | 0,142<br>(0,323)     |
| Income (expenditures per household member log)                        | 0,015***<br>(0,005)  |                      | 0,441**<br>(0,174)   |                      |
| Income tertile: Lower   |                      | -0,008<br>(0,008)    |                      | -0,120<br>(0,273)    |
| Income tertile: Upper   |                      | 0,016**<br>(0,008)   |                      | 0,67***<br>(0,238)   |
| <b><i>Community characteristics</i></b>                               |                      |                      |                      |                      |
| Fandène (household belonging to Fandène community, 1 = yes)           | 0,046**<br>(0,022)   | 0,046**<br>(0,022)   | 0,550<br>(0,67)      | 0,568<br>(0,676)     |
| Sanghé (1= household belonging to Sanghé community, 1 = yes)          | 0,017<br>(0,020)     | 0,018<br>(0,020)     | 1,573<br>(0,643)     | 1,588<br>(0,643)     |
| Mont Rolland (household belonging to Mont Rolland community, 1 = yes) | 0,027<br>(0,022)     | 0,027<br>(0,021)     | 1,986*<br>(0,636)    | 1,779<br>(0,629)     |
| Number of observations  | 2855                 | 2855                 | 118                  | 118                  |
| Chi <sup>2</sup> / F value  | 103,00               | 103,96               | 3,990                | 4,176                |
| Corrected r squared   |                      |                      | 0,264                | 0,289                |
| Prob > Chi <sup>2</sup> / F value                                     | 0,000                | 0,000                | 0,000                | 0,000                |
| Frequencies of actual / predicted outcomes                            | 94,7 %               | 94,7 %               |                      |                      |

\* Significant at 0,1 level      \*\* Significant at 0,05 level      \*\*\*significant at 0,01 level

Source: own estimation based on ZEF-ISED survey data

As far as the variables at the household level are concerned, it turns out that income has an impact on the demand for health care services and expenditure. The relatively better-off people in a community make more use of services and spend more money in the event of hospitalization. This is in line with findings on demand for health care in other developing countries (Gertler and van der Gaag 1990).

With respect to village effects, people living in Fandène have a higher effective demand for hospitalization than the people in the other three communities<sup>10</sup>. A possible explanation is the fact that Fandène is the oldest mutual and, according to our interview partners, it is well organized and functions well. It is also the closest mutual to the hospital St. Jean de Dieu.

To sum up, it can be said that members are (can be) hospitalized more often and pay considerably less for treatment than nonmembers. Other important factors are “age,” “type of illness,” “gender,” “income,” and “village effects.”

The case study on the community-based health insurance schemes in Senegal shows that the formation of a health insurance scheme for households in rural areas is possible and can result in a better access to health care for otherwise excluded people. Especially in places where local institutions have already developed forms of mutual help, possibilities seem to exist for developing them into more formalized approaches. From the Senegalese case study, besides an existing local network, the existence of a viable health care provider is of tremendous importance. Without the financial support of the hospital as well as the well-perceived quality provided—the hospital is well known for its good quality in service provision—it is difficult to imagine that the mutuals would still exist. Hence, subsidies seem to be necessary if one wants to set up an insurance scheme for poor people.

Finally, individual and household characteristics also play a role in the viability of rural health insurance schemes. In areas with widespread poverty and a scattered population, setting up a health insurance scheme is much more difficult than in richer and more densely populated areas. As the analysis of the determinants of participation in microinsurance schemes has revealed against the expectations of most donors and policymakers, they do not necessarily reach all population groups in a village. In fact, for the lowest income group the premium to insure the whole family reaches nearly 8 percent of the household's annual income.<sup>11</sup> Support for this group should therefore be secured by the state. This could be done, for example, in the form of subsidized premiums.

## VII. CONCLUSIONS

The results of experience with mutual health organization in Senegal suggest that rural health insurance for the poor is feasible under certain conditions. More important, it could be shown that access to health insurance can have a positive impact on their members' economic and social situation. Further investigation should be devoted to the extent to which health insurance, or its lack, affects people's labor productivity and willingness to undertake risky, but potentially profitable investments.

To enlarge access to health care for the poor and the rural population, community-based health insurance schemes can be an important element and a first step. It allows some limited pooling of risks and thereby leads to an improvement in the health care system, where most people otherwise have to pay their health expenditure out of pocket. However, the study also points to the persistent problem of social exclusion—that the community's poorest members have no opportunity to participate and not enough resources to

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<sup>10</sup> This effect clearly pops up, when leaving the mutual Fandène outside and the remaining mutuals get a significant negative coefficient.

<sup>11</sup> An individual household has to weigh these costs against the probability of being hospitalized and the average cost for treatment. The direct average financial costs for one hospitalization of a household member lies already above 20 percent of the annual income of the household.

pay the required premium. To overcome these limitations of community-based health insurance, broader risk pools are required. In particular, the role of external financial support such as government subsidies, donor funding, and reinsurance in encouraging social inclusion needs to be further explored. Further research is needed on how these schemes can be scaled up, replicated, and linked to other social risk-management instruments like social funds.



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